calculating [an] image [frame] <u>frames</u> for each eye of each of said <u>at least two</u> users;

displaying the image frames to each of said eyes of said <u>at least two</u> users;

obtaining updated position and orientation values of said <u>at least two</u> users;

determining if the virtual environment has been modified;

redefining <u>positions and orientations of the nodes of</u> the virtual object [nodes] if the virtual environment has been modified;

recalculating the image frames for each of said eyes of said <u>at least two</u> users; and

displaying the recalculated image [frame] <u>frames</u> to each of said eyes of said <u>at least two</u> users.--

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<u>REMARKS</u>

Favorable reconsideration of the present application in view of the present amendment and in light of the following discussion is respectfully requested.

Claims 1-30 are currently pending in the application, Claims 1, 6, 13, 15, 26 and 30 having been amended herewith.

In the outstanding Official Action, the title of the invention was objected to as not being descriptive. In addition, Claim 26 was rejected under 35 U.S.C. §102(e) as anticipated by, or, in the alternative, under 35 U.S.C §103 as being obvious over, <u>Waldren</u> (Patent No. 4,884,219). Claims 1-25 and 27-30 were rejected under 35 U.S.C. §103 as being

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unpatentable over Waldren in view of Fisher et. al ("Virtual Environment Display System") (hereinafter Fisher).

Applicants acknowledge with appreciation the courtesy of an interview extended to Applicants' representative on February 9, 1996, during which time the pending claims and support for the current changes were discussed. No agreement was reached as to the patentability of any claims, and it was agreed that the present amendment would point out where the support for the changes to the claims and specification could be found in the Appendices.

The support for the creation of a data flow network can be found in Figure 2 and throughout Appendix 2. In modules Flex.pas, pages 317-354, and DMEdit.pas, pages 194-214, part of the creation of a data flow network is implemented. The code on pages 317-354 "supports the Flex window which visually shows what the DM's look like, how they are hooked up, etc." Specifically, on page 321, procedure **FlexUpdate** is implemented which is "[c]alled in response to an update event for the Flex window." Pages 328 and 329 implement **DragSelections** and **DragAndSelect** which allow the selected objects (input units, function units or output units) to be dragged to new positions. Additionally, pages 332 through 337 implement the procedure **ConnectDMInput** which allows "the user to drag a line from an input on this DM to an output on another DM to connect the two. If ConnectAll is true, then connect all the inputs of this DM to the outputs of the other." Additionally, input units, function units and output units can be added using

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procedure **FlexAdd**, and any of the units can be searched for using function **SearchDMs**, as shown between pages 339 and 341.

Furthermore, the routines contained in file DMEdit.pas are used to "[p]ut up a dialogue box to edit [the] name, inputs, outputs and type of a DM module." Specifically, function **SetDMOutput**, on page 196, "[p]ut[s] up a dialogue box to allow the user to edit the outputs for the selected DM's." Additionally, function **CheckDM**, defined on page 206, "[r]eturn[s] true if the dm has its inputs and outputs hooked up, has a name and is ready to be initialized."

The second set of routines defined in the appendices are used to produce output values from function units and are described in procedures DataMassage.pas, pages 149-177, HandleDMs.pas, pages 428-438, ShowDM.pas, pages 666 and 667, SimpleDMs.pas, pages 668-670 and 644-663, FixedDMs.pas, pages 312-316, SomeDMs.pas, pages 690-715, TimeDMs.pas, pages 716-724, TrigDMs.pas, pages 772-777, and WaveformDMs.pas, pages 778-784. DataMassage.pas contains procedure **AddCodeDMs** which searches for DM code modules to implement function units. As shown on page 157, data modules fall into groups of miscellaneous, filter, arithmetic, boolean, trigonometric, mathematic, point modifying, fixed and user functions. The miscellaneous group includes **PassRaw**, **Scale-Offset**, **ShowValue**, **Const**, **Sort Two Numbers**, **Clock**, and **VariClock**. Additionally, examples of trigonometric functions are **arcsine**, **arctan**, and **sine**, as shown with other functions on page 158. Furthermore, DataMassage.pas also contains procedure **doPlay** to "play back the massaged data" which was previously recorded so that a data flow network can have a series of known inputs. This data can be recorded using the procedure **doRecord** defined on page 170, and the data is generally massaged using procedure **DataMassage**, defined on page 171. In order to create the data flow network, function **HookupInputs** is defined in module HandleDMs.pas on page 430, and procedure **HookupOutputs** is defined on page 432. Furthermore, procedure **HookupAllDMs** is called to "[m]ake sure all the dm modules are hooked up properly."[1] The remaining modules of the second set of routines implement the functionality of each of the function units and support the use of a data flow network for describing a virtual world using a data flow network.

The third set of routines integrates the data flow network with the point hierarchy by implementing the output units and how they modify point positions of points in the point hierarchy. As function units send outputs to output units, the routines in PointDMs.pas calculate the points' position and orientation. Global point calculations can be performed using **doGlobDelta** and **doGlobDistance**, and local calculations are performed with **doPtOffset** and **HandlePtOffset**. Furthermore, a global position can be set using **doGlobPos**. These routines are disclosed in detail between pages 497 and 519.

[1] Appendix 2, page 434.

Once the values for the output units have been calculated, the fourth set of routines renders the resulting point hierarchies to create a virtual world, such as the virtual worlds shown in Figures 3-5. The procedures implemented in module TreeRender.pas, on pages 765-771, draw the resulting tree using procedure **TreeDraw** to animate a multi-person virtual world. **TreeDraw** uses procedure **SubTreeDraw** to render trees by recursively rendering the subtrees which make up a tree. Furthermore, procedure **TreeRender** "[r]ender[s] the tree into the tree window if the window is on." In addition, when a tree is updated, procedure **rTreeUpdate** is called, as defined on page 770, to calculate new point positions and orientations within the defined constraints. Additional tree rendering is performed by module Tree3D.pas, pages 378-401, using the procedure **TreeUpdate**, and the point hierarchy is traversed or "walked" in module formTree.pas using procedures **dirtyTreeWalk**, **PreFixTreeWalk**, **InFixTreeWalk** and **PostFixTreeWalk** to propagate changes through the point hierarchy.

Tree creation is performed using module TreeEdit.pas, pages 750-764, using procedures **TreeEdPt**, **TreeAddVector**, **ScalePoint** and **AddCube**. The point hierarchy can further be modified using module Tree3D.pas using procedures **MoveNode**, **TreeCopy**, **TreeCut**, **TreePaste**, **TreeEdit**, **TreeMouse**, **doTreeMenu**, **GetTree** and **PutTree**. Additionally, module formTree.pas provides the implementation of function **InsertPt** which inserts a 3d point into the world tree structure being created. glob is true if x, y, z are given in global coordinates, false if they are local to the given parent. "parent" is the point that will be the new point's parent, x,y,z are cartisian [sic; cartesian] coordinates, r, p, yw are the roll, pitch and yaw for any subpoints of the new point. "rbool" is true if a connecting line should be drawn from this point and "dbool" is true if a connecting line should be drawn down to this point's children. The point is inserted into the tree as the farthest right child of the given parent.[2]

Based on this cited support, the changes to the specification and claims are believed to be supported by the originally filed application.

Submitted herewith is new Figure 7 to render the drawings consistent with the claims by showing a point hierarchy, as required by 37 C.F.R. § 1.83(a). The drawings are believed to be supported by the appendices originally filed with the specification, as described above, and by Figure 3 which shows the gear. Submitted herewith is a further letter requesting approval by the Official Draftsperson for the drawing addition. Upon receiving approval for the requested drawing addition, and upon receiving a formal Notice of Allowance, prior to payment of the base issue fee, formal drawings, including the requested drawing addition, will be filed.

In response to the objection to the title, a new title has been provided which is more indicative of the invention to which the claims are directed.

In response to the rejection of Claim 26 under 35 U.S.C. §102(e) as being anticipated by, or, in the alternative, under

[2] Appendix 2, pages 388 and 389.

35 U.S.C. §103 as obvious over, Waldren, Applicants respectfully traverse the rejection in light of amended Claim 26. Waldren does not teach or suggest "first emulating means including a first point hierarchy and a first data flow network," and no motivation or incentive to modify Waldren to meet this positively recited limitation is found therein. Applicants, therefore, submit that Claim 26 is neither anticipated nor rendered obvious by Waldren and request the withdrawal of the rejection.

In response to the rejection of Claims 1-25 and 27-30 under 35 U.S.C. §103 as being unpatentable over Waldren in view of Fisher, Applicants respectfully traverse the rejection in light of amended Claims 1, 26 and 30. Waldren does not teach or suggest the positively recited limitation in Claim 1 of

> the first body emulating means including a first point hierarchy and a first data flow network, the first point hierarchy for controlling a shape and an orientation of the first cursor...; [and] the second body emulating means including a second point hierarchy and a second data flow network, the second point hierarchy for controlling a shape and an orientation of the second cursor....

Waldren, therefore, fails to anticipate Claim 1. In addition, Fisher fails to teach or suggest the same limitations missing from Waldren; therefore, Fisher does not anticipate Claim 1. Furthermore, the combination of Waldren and Fisher fails to teach the positively recited limitation because a limitation not found in either cannot be taught by the combination of the two. Therefore, Claim 1 is patentably distinguishing over the cited references and Claims 2-25 are believed to be patentable for at least the reasons set forth for the patentability of Claim 1.

In reference to Claims 27-29, Waldren fails to disclose the positively recited limitation in Claim 26 (from which Claims 27-29 depend) of

> the first emulating means including a first point hierarchy and a first data flow network, the first point hierarchy for controlling a shape and an orientation of a first cursor,...[and] the second emulating means including a second point hierarchy and a second data flow network, the second point hierarchy for controlling a shape and an orientation of a second cursor....

Claim 26, therefore, is not anticipated by Waldren. Fisher also fails to teach the same positively recited limitation missing in Waldren; therefore, Fisher does not anticipate Claim 26. Furthermore, the combination of Waldren and Fisher does not render obvious Claim 26 because the same deficiency in both references cannot be overcome by combining the references, neither of which describe the positively recited limitation. Consequently, Claim 26 is patentably distinguishing over the prior art of record, and dependent Claims 27-29 are patentable for at least the reasons set forth for the patentability of Claim 26.

In response to the rejection of Claim 30 under 35 U.S.C. § 103, Applicants respectfully submit that Claim 30 is patentably distinguishing over Waldren in the recitation of

> constructing virtual objects within the virtual environment using a point hierarchy and a data flow network for controlling motion of nodes of the virtual objects...[by] attaching each node of the

> virtual objects hierarchically...to form the point hierarchy...and building the data flow network as an interconnection of input units, function units and output units....

Neither Waldren nor Fisher disclose this positively recited limitation; therefore, their combination cannot overcome the deficiency in both disclosures. Consequently, Claim 30 is not rendered obvious by the combination of Waldren and Fisher, and Applicants respectfully request that this rejection be withdrawn.

Further to the interview of February 9, 1996, although Examiner Treat indicated that the amended claims might be subject to a restriction requirement, Applicants respectfully submit that the present claims are directed to the same invention as was previously searched and, therefore, should not be subject to a restriction requirement. The present claims have further clarified the first and second body emulating means previously recited in Claim 1, and the first and second emulating means previously recited in Claim 26. Additionally, the step of constructing virtual objects clarifies the generating step as previously recited in Claim 30.

Consequently, in view of the present amendment and in light of the above discussion, the pending claims are believed to be supported by the originally filed specification and its appendices and are believed to be patentably distinguishing over the prior art of record. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.

Eckhard H. Kuesters

Gregory J. Maier
Attorney of Record
Registration No. 25,599
Eckhard H. Kuesters
Attorney of Record
Registration No. 28,870

Crystal Square Five - Fourth Floor
1755 Jefferson Davis Highway
Arlington, Virginia 22202
(703) 413-3000
Fax #: (703) 413-2220
GJM/EHK/MRC/cmc